

WHAT IS CLAIMED IS:

1 1. A transmitting apparatus for an interactive communication
2 system using a broadcast wave, comprising:

3 first storage means for storing a plurality of frames
4 of image data;

5 second storage means for storing control information
6 which shows links between said plurality of frames of image
7 data stored in said first storage means, and which indicates
8 a combining of a supplementary design with the image data
9 stored in the first storage means, the supplementary design
10 being stored by a receiving apparatus and being combined
11 with an image represented by the image data; and

12 transmitting means for repeatedly transmitting a
13 predetermined number of frames of image data together with
14 corresponding control information.

1 2. A transmitting apparatus according to Claim 1, wherein
2 said transmitting means includes:

3 reading means for repeatedly reading said predetermined
4 number of frames of image data together with said
5 corresponding control information from said first and second
6 storage means;

7 multiplexing means for multiplexing image data and
8 control information read by said reading means by
9 transmitting said image data and control information in
10 image sections and vertical blanking intervals,
11 respectively, of a television signal; and

12 output means for outputting the multiplexed television
13 signal as an analog broadcast wave.

1 3. A transmitting apparatus according to Claim 1, wherein
2 said image data and control information stored in said first
3 and second storage means are digitized,

4 and wherein said transmitting means includes:

5 reading means for repeatedly reading said predetermined
6 number of frames of image data together with said
7 corresponding control information from said first and second
8 storage means;

9 multiplexing means for converting image data and
10 control information read by said reading means into digital
11 data streams, and multiplexing said digital data streams to
12 produce a multiplexed stream; and

13 output means for outputting said multiplexed stream as
14 a digital broadcast wave.

1 4. A transmitting apparatus for an interactive communication
2 system using a broadcast wave, comprising:

3 first storage means for storing a plurality of frames
4 of image data with an identifier allocated to each frame of
5 image data;

6 second storage means for storing control information
7 for each frame of image data showing a link to another frame
8 of image data stored in said first image storage means, the
9 same identifier being allocated to corresponding image data

10 and control information, and said control information also
11 indicating a combining of a supplementary design with the
12 image data stored in the first storage means, the
13 supplementary design is being stored by a receiving
14 apparatus and being combined with an image represented by
15 the image data; and

16 transmitting means for repeatedly transmitting a
17 predetermined number of frames of image data together with
18 corresponding control information.

1 5. A transmitting apparatus according to Claim 4, wherein
2 said control information includes identifiers allocated to
3 linked image data.

1 6. A transmitting apparatus according to Claim 5, wherein
2 said transmitting means includes:

3 reading means for repeatedly reading all combinations
4 of image data and control information from said first and
5 second storage means, each combination including image data
6 and control information with the same identifier;

7 multiplexing means for multiplexing image data and
8 control information read by said reading means by
9 transmitting said image data and control information in
10 image sections and vertical blanking intervals,
11 respectively, of a television signal; and

12 output means for outputting the multiplexed television
13 signal as an analog broadcast wave.

1 7. A transmitting apparatus according to Claim 6, wherein
2 said multiplexing means allocates an image representing an
3 identifier arranged at a fixed position in a non-displayed
4 part of an image section.

1 8. A transmitting apparatus according to Claim 5, wherein
2 said transmitting means includes:

3 reading means for repeatedly reading all combinations
4 of image data and control information from said first and
5 second storage means, each combination including one frame
6 of image data and corresponding control information with the
7 same identifier;

8 multiplexing means for converting image data and
9 control information read by said reading means into digital
10 data streams, and multiplexing said digital data streams so
11 as to produce a multiplexed stream; and

12 output means for outputting said multiplexed stream as
13 a digital broadcast wave.

1 9. A transmitting apparatus according to Claim 8, wherein
2 said multiplexing means includes:

3 a converter for converting image data into a first
4 digital data stream and control information into a second
5 digital data stream;

6 an ID allocating unit for allocating first identifying
7 information to said first digital data stream for

8 identifying image data and second identifying information to
9 said second data stream for identifying control information;
10 a table producing unit for producing a mapping table
11 showing the correspondence between said first identifying
12 information and image data identifiers and the
13 correspondence between said second identifying information
14 and control information identifiers; and

15 a multiplexing unit for multiplexing said first digital
16 data stream, said second digital data stream, and said
17 mapping table.

1 10. A transmitting apparatus according to Claim 5, further
2 comprising third storage means for storing audio data
3 corresponding to said image data, the same identifiers being
4 allocated to corresponding image data and audio data,

5 wherein said transmitting means transmits audio data as
6 well as image data.

1 11. A transmitting apparatus according to Claim 10, wherein
2 said transmitting means includes:

3 reading means for repeatedly reading all combinations
4 of image data, control information, and audio data from said
5 first, second, and third storage means, each combination
6 including image data, control information, and audio data
7 with the same identifier;

8 multiplexing means for multiplexing a combination of
9 image data, audio data, and control information read by said

10 reading means to produce a television signal, said audio
11 data being transmitted on a television audio signal, a
12 plurality of frames of image data and control information
13 being transmitted in the image section and vertical blanking
14 interval, respectively, of a television image signal, and
15 the number of transmitted frames of image data and control
16 information depending on the reproducing time of the audio
17 data; and

18 output means for outputting the multiplexed television
19 signal as an analog broadcast wave.

1 12. A transmitting apparatus according to Claim 11, wherein
2 said multiplexing means allocates an image representing
3 an identifier in a fixed position in a non-displayed part of
4 said image section.

1 13. A transmitting apparatus according to Claim 10, wherein
2 said transmitting means comprises:

3 reading means for repeatedly reading all combinations
4 of image data, control information, and audio data from said
5 first, second, and third storage means, each combination
6 including one frame of image data, control information, and
7 audio data with the same identifier;

8 multiplexing means for converting image data, audio
9 data, and control information read by said reading means
10 into digital data streams, and multiplying said digital data
11 streams to produce a multiplexed stream; and

12 output means for outputting said multiplexed stream as
13 a digital broadcast wave.

1 14. A transmitting apparatus according to Claim 13, wherein
2 said multiplexing means comprises:

3 a converter for converting image data into a first
4 digital data stream, control information into a second data
5 stream, and audio data into a third digital data stream;

6 an ID allocating unit for allocating said first digital
7 data stream first identifying information to identify image
8 data, said second digital data stream second identifying
9 information to identify control information, and said third
10 digital data stream third identifying information to
11 identify audio data;

12 a table producing unit for producing a mapping table
13 showing the correspondence between said first identifying
14 information and image data identifiers, the correspondence
15 between said second identifying information and control
16 information identifiers, and the correspondence between said
17 third identifying information and audio data identifiers;
18 and

19 a multiplexing unit for multiplexing said first,
20 second, and third digital data streams, and said mapping
21 table.

1 15. A transmitting apparatus for an interactive
2 communication system using a broadcast wave, comprising:

3 obtaining means for obtaining pieces of page
4 information representing a page containing characters and
5 images, said page information including link information to
6 show a link to another page, character information, and
7 image information;

8 first producing means for producing one frame of image
9 data containing characters and images in accordance with
10 said character information and image information included in
11 a piece of page information;

12 second producing means for interpreting said link
13 information included in said obtained page information and
14 producing, for each frame of image data, control information
15 including image link information about a link to another
16 frame of image data and supplementary design combining
17 information indicating a combining of a supplementary design
18 with the frame of image data generated by the first
19 producing means, the supplementary design being stored by a
20 receiving apparatus and being combined with an image
21 represented by the image data;

22 first storage means for storing a predetermined number
23 of frames of image data produced by said first producing
24 means;

25 second storage means for storing said control
26 information produced by said second producing means; and

27 transmitting means for repeatedly transmitting said
28 predetermined number of frames of image data together with
29 said control information.

1 16. A transmitting apparatus according to Claim 15, wherein
2 said obtaining means obtains said page information from
3 the World Wide Web on the Internet.

1 17. A transmitting apparatus according to Claim 16, wherein
2 the second producing means includes:

3 determining means for determining a specific image part
4 by interpreting layout information in said obtained page
5 information; and

6 generating means for generating supplementary design
7 combining information indicating a supplementary design
8 which is related to the determined specific image part,

9 wherein the page information also includes layout
10 information showing a layout of characters and images.

1 18. A transmitting apparatus according to Claim 17, wherein
2 the determining means determines a headline as the specified
3 image part, and the generating means generates supplementary
4 design combining information which indicates a combining of
5 the specific image part with a supplementary design for bold
6 display.

1 19. A transmitting apparatus according to Claim 18, wherein
2 the supplementary design combining information includes a
3 classification of the specific image part.

1 20. A transmitting apparatus according to Claim 18, wherein
2 the supplementary design combining information includes
3 coordinates indicating the specific image part.

1 21. A transmitting apparatus according to Claim 18, wherein
2 the second producing means includes:

3 supplementary design storage means for storing a
4 supplementary design beforehand; and

5 supplementary design adding means for reading a
6 supplementary design from the supplementary design storage
7 means and for adding the read supplementary design to the
8 stored control information.

1 22. A transmitting apparatus according to Claim 21, wherein
2 the second producing means further includes supplementary
3 design obtaining means for obtaining a supplementary design
4 from outside and storing the obtained supplementary design
5 in the supplementary design storage means.

1 23. A transmitting apparatus according to Claim 17, wherein
2 the determining means determines one of a character and an
3 image to which a link has been attached as the specific
4 image part, and the generating means generates supplementary
5 design combining information indicating a combining of
6 supplementary design, which shows that a link to another
7 frame of image data is attached, with the specified image
8 part.

1 24. A transmitting apparatus according to Claim 23, wherein
2 the determining means determines one of a character and an
3 image to which a link has been attached as the specific
4 image part, and the generating means generates supplementary
5 design combining information indicating a combining of
6 supplementary design, which shows that a link to another
7 frame of image data is attached, with the specified image
8 part.

1 25. A transmitting apparatus according to Claim 23, wherein
2 the supplementary design combining information includes
3 coordinates indicating the specific image part.

1 27. A transmitting apparatus according to Claim 26, wherein
2 the second producing means further includes supplementary
3 design obtaining means for obtaining a supplementary design
4 from outside and storing the obtained supplementary design
5 in the supplementary design storage means.

1 28. A transmitting apparatus according to Claim 17, wherein
2 the second producing means includes:

3 supplementary design storage means for storing a
4 supplementary design beforehand; and

5 supplementary design adding means for reading a
6 supplementary design from the supplementary design storage
7 means and for adding the read supplementary design to the

8 stored control information.

1 29. A transmitting apparatus according to Claim 28, wherein
2 the second producing means further includes supplementary
3 design obtaining means for obtaining a supplementary design
4 from outside and storing the obtained supplementary design
5 in the supplementary design storage means.

1 30. A transmitting apparatus according to Claim 29, wherein
2 the determining means determines a headline as the specified
3 image part, and the generating means generates supplementary
4 design combining information which indicates a combining of
5 the specific image part with a supplementary design for bold
6 display.

1 31. A transmitting apparatus according to Claim 30, wherein
2 the supplementary design combining information includes a
3 classification of the specific image part.

1 32. A transmitting apparatus according to Claim 30, wherein
2 the supplementary design combining information includes
3 coordinates indicating the specific image part.

1 34. A transmitting apparatus according to Claim 33, wherein
2 the supplementary design combining information includes a
3 classification of the specific image part.

1 35. A transmitting apparatus according to Claim 33, wherein
2 the supplementary design combining information includes
3 coordinates indicating the specific image part.

1 36. A transmitting apparatus according to Claim 15, wherein
2 the second producing means includes:

3 determining means for interpreting layout information
4 in said obtained page information and determining a specific
5 image part; and

6 generating means for generating supplementary design
7 combining information indicating a supplementary design
8 which is related to the determined specific image part,

9 wherein the page information also includes layout
10 information showing a layout of characters and images.

1 37. A transmitting apparatus according to Claim 36, wherein
2 the determining means determines the specified image part as
3 a headline, and the generating means generates supplementary
4 design combining information which indicates a combining of
5 the specific image part with a supplementary design for bold
6 display.

1 38. A transmitting apparatus according to Claim 37, wherein
2 the supplementary design combining information includes a
3 classification of the specific image part.

1 39. A transmitting apparatus according to Claim 37, wherein

2 the supplementary design combining information includes
3 coordinates for determining the specific image part.

1 40. A transmitting apparatus according to Claim 37, wherein
2 the second producing means includes:

3 supplementary design storage means for storing a
4 supplementary design beforehand; and

5 supplementary design adding means for reading a
6 supplementary design from the supplementary design storage
7 means and for adding the read supplementary design to the
8 stored control information.

1 41. A transmitting apparatus according to Claim 40, wherein
2 the second producing means further includes supplementary
3 design obtaining means for obtaining a supplementary design
4 from outside and storing the obtained supplementary design
5 in the supplementary design storage means.

1 42. A transmitting apparatus according to Claim 36, wherein
2 the determining means determines one of a character and an
3 image to which a link has been attached as the specific
4 image part, and the generating means generates supplementary
5 design combining information indicating a combining of
6 supplementary design, which shows that a link to another
7 frame of image data is attached, to the specified image
8 part.

1 44. A transmitting apparatus according to Claim 42, wherein
2 the supplementary design combining information includes
3 coordinates indicating the specific image part.

1 45. A transmitting apparatus according to Claim 42, wherein
2 the second producing means includes:

3 supplementary design storage means for storing a
4 supplementary design beforehand; and

5 supplementary design adding means for reading a
6 supplementary design from the supplementary design storage
7 means and for adding the read supplementary design to the
8 stored control information.

1 46. A transmitting apparatus according to Claim 45, wherein
2 the second producing means further includes supplementary
3 design obtaining means for obtaining a supplementary design
4 from outside and storing the obtained supplementary design
5 in the supplementary design storage means.

1 47. A transmitting apparatus according to Claim 36, wherein
2 the second producing means includes:

3 supplementary design storage means for storing a
4 supplementary design beforehand; and

5 supplementary design adding means for reading a
6 supplementary design from the supplementary design storage
7 means and for adding the read supplementary design to the
8 stored control information.

1 48. A transmitting apparatus according to Claim 47, wherein
2 the second producing means further includes supplementary
3 design obtaining means for obtaining a supplementary design
4 from outside and storing the obtained supplementary design
5 in the supplementary design storage means.

1 50. A transmitting apparatus according to Claim 49, wherein
2 the supplementary design combining information includes a
3 classification of the specific image part.

1 52. A transmitting apparatus according to Claim 48, wherein
2 the determining means determines one of a character and an
3 image to which a link has been attached as the specific
4 image part, and the generating means generates supplementary
5 design combining information indicating a combining of
6 supplementary design, which shows that a link to another
7 frame of image data is attached, with the specified image
8 part.

1 53. A transmitting apparatus according to Claim 52, wherein
2 the determining means determines one of a character and an
3 image to which a link has been attached as the specific
4 image part, and the generating means generates supplementary
5 design combining information indicating a combining of
6 supplementary design, which shows that a link to another
7 frame of image data is attached, with the specified image

8 part.

1 55. A transmitting apparatus according to Claim 15, wherein
2 said first producing means allocates identifiers to image
3 data,

4 said second producing means allocates said identifiers
5 to control information corresponding to said image data,

6 said first and second storage means store said image
7 data and control information together with said identifiers,
8 and

9 said control information is represented by said
10 identifiers of linked image data.

1 56. A transmitting apparatus according to Claim 55, wherein
2 said transmitting means includes:

3 reading means for repeatedly reading all combinations
4 of image data and control information from said first and
5 second storage means, each combination including one frame
6 of image data and control information with the same
7 identifier;

8 multiplexing means for multiplexing image data and
9 control information read by said reading means by
10 transmitting said image data and control information in the
11 image section and vertical blanking interval, respectively,
12 of a television signal; and

13 output means for outputting the multiplexed television
14 signal as an analog broadcast wave.

1 57. A transmitting apparatus according to Claim 56, wherein
2 said multiplexing means transmits an image representing an
3 identifier in a fixed position in a non-displayed part of
4 said image data.

1 58. A transmitting apparatus according to Claim 55, wherein
2 said transmitting means includes:

3 reading means for repeatedly reading all combinations
4 of image data and control information from said first and
5 second storage means, each combination including one frame
6 of image data and corresponding control information;

7 multiplexing means for converting image data into a
8 first digital data stream and control information read by
9 said reading means into a second digital data stream, and
10 multiplexing said digital data streams so as to produce a
11 multiplexed stream; and

12 output means for outputting said multiplexed stream as
13 a digital broadcast wave.

1 59. A transmitting apparatus according to Claim 58, wherein
2 said multiplexing means includes:

3 a converter for converting image data into a first
4 digital data stream and control information into a second
5 digital data stream;

6 an ID allocating unit for allocating first identifying
7 information to said first digital data stream for

8 identifying image data and second identifying information to
9 said second digital data stream for identifying control
10 information;

11 a table producing unit for producing a mapping table
12 showing the correspondence between said first identifying
13 information and image data identifiers and the
14 correspondence between said second identifying information
15 and control information identifiers; and

16 a multiplexing unit for multiplexing said first digital
17 data stream, said second digital data stream, and said
18 mapping table.

1 60. A transmitting apparatus according to Claim 55, further
2 comprising:

3 third producing means for producing audio data
4 according to audio information contained in said page
5 information, and allocating said identifiers to said audio
6 data corresponding to said image data; and

7 third storage means for storing said audio data
8 together with said identifiers,

9 wherein said transmitting means transmits said audio
10 data as well as said image data.

1 61. A transmitting apparatus according to Claim 60, wherein
2 said transmitting means includes:

3 reading means for repeatedly reading all combinations
4 of image data, audio data, and control information from said

5 first, second, and third storage means, each combination
6 including image data, audio data, and control information
7 with the same identifier;

8 multiplexing means for multiplexing one combination of
9 image data, audio data, and control information read by said
10 reading means to produce a television signal, said audio
11 data being transmitted on a television audio signal, a
12 plurality of frames of image data and control information
13 required for reproducing said audio data being transmitted
14 in the image section and vertical blanking interval,
15 respectively, of a television image signal; and

16 output means for outputting the multiplexed television
17 signal as an analog broadcast wave.

1 62. A transmitting apparatus according to Claim 61, wherein
2 said multiplexing means transmits an identifier representing
3 an image in a fixed position in a non-displayed part of said
4 image section.

1 63. A transmitting apparatus according to Claim 60, wherein
2 said transmitting means includes:

3 reading means for repeatedly reading all combinations
4 of image data, audio data, and control information from said
5 first, second, and third storage means, each combination
6 including image data, audio data, and control information
7 with the same identifier;

8 multiplexing means for converting image data, audio

9 data, and control information read by said reading means
10 into digital data streams, and multiplexing said digital
11 data streams so as to produce a multiplexed stream; and
12 output means for outputting said multiplexed streams as
13 a digital broadcast wave.

1 64. A transmitting apparatus according to Claim 63, wherein
2 said multiplexing means includes:

3 a converter for converting image data into a first
4 digital data stream, control information into a second
5 digital data stream, and audio data into a third digital
6 data stream;

7 an ID allocating unit for allocating first identifying
8 information to said first digital data stream to identify
9 image data, second identifying information to said second
10 digital data stream to identify control information, and
11 third identifying information to said third digital data
12 stream to identify audio data;

13 a table producing unit for producing a mapping table
14 showing the correspondence between said first identifying
15 information and image data identifiers, the correspondence
16 between said second identifying information and control
17 information identifiers, and the correspondence between said
18 third identifying information and audio data identifiers;
19 and

20 a multiplexing unit for multiplexing said first,
21 second, and third digital data streams, and said mapping

22 table.

1 65. A receiving apparatus for an interactive communication
2 system using a broadcast wave, wherein said broadcast wave
3 is produced by multiplexing a plurality of frames of image
4 data, and control information which includes image link
5 information for each frame of image data showing links with
6 other frames of image data and supplementary design
7 combining information indicating the combining of a
8 supplementary design with said plurality of frames of image
9 data, said broadcast wave being repeatedly transmitted, and
10 said supplementary design being combined with an image of
11 the image data,

12 wherein said receiving apparatus comprises:

13 separating means for separating a frame of image data
14 and corresponding control information from said broadcast
15 wave;

16 supplementary design storage means for storing at least
17 one supplementary design;

18 supplementary design reading means for reading a
19 supplementary design from the supplementary design storage
20 means, based on the separated control information;

21 combining means for combining the read supplementary
22 design with the separated image data;

23 storage means for storing said combined image data and
24 separated control information;

25 reproducing means for reproducing said stored image

26 data to output an image signal;
27 operation means for receiving an operation instruction
28 from a user to switch image data; and
29 control means for controlling said separating means to
30 separate another frame of image data designated by said
31 control information stored in said storage means according
32 to said operation instruction.

1 66. A receiving apparatus according to Claim 65;

2 wherein the supplementary design combining information
3 includes information indicating a combining of a
4 supplementary design with a specific image part and a
5 classification of the specific image part,

6 wherein the supplementary design reading means
7 includes:

8 determining means for determining the classification in
9 the supplementary design combining information included in
10 the control information separated by the separating means;
11 and

12 supplementary design specifying means for specifying a
13 supplementary design in the supplementary design storage
14 means which corresponds to the determined classification.

1 67. A receiving apparatus according to Claim 66, wherein the
2 classification indicates a headline as the specific image
3 part and the supplementary design specifying means specifies
4 a supplementary design which emphasizes the specific image

5 part.

1 68. A receiving apparatus according to Claim 67,

2 wherein the supplementary design combining information
3 includes coordinate information indicating the specific
4 image part,

5 wherein the determining means reads the coordinate
6 information; and

7 wherein the combining means combines the image data and
8 the supplementary design based on the read coordinate
9 information.

1 69. A receiving apparatus according to Claim 68,

2 wherein the supplementary design is an image of a
3 rectangle,

4 wherein the combining means includes supplementary
5 design converting means for converting the size of the
6 supplementary design so that the rectangle surrounds the
7 headline,

8 and wherein the combining means combines the converted
9 supplementary design and the image data.

1 70. A receiving apparatus according to Claim 66, wherein the
2 classification indicates one of a character and image to
3 which a link has been attached as the specific image part
4 and wherein the supplementary design specifying means
5 specifies a supplementary design which shows that the

6 specific image part has an attached link to other image
7 data.

1 71. A receiving apparatus according to Claim 70, wherein the
2 supplementary design combining information includes
3 coordinate information indicating the specific image part,

4 wherein the determining means reads the coordinate
5 information; and

6 wherein the combining means combines the image data and
7 the supplementary design based on the read coordinate
8 information.

1 72. A receiving apparatus according to Claim 71,

2 wherein the supplementary designs stored in the
3 supplementary design storage means which are used for
4 showing that a link to other image data is attached are
5 composed of two types which respectively correspond to a
6 selection and a non-selection state,

7 wherein the operation means receives a selection
8 operation from the user for one of a character and an image
9 to which a link is attached,

10 wherein the receiving apparatus includes state storage
11 means for storing a selection or non-selection state in
12 accordance with an instruction from the operation means, and

13 wherein the supplementary design reading means reads a
14 supplementary design corresponding to a state stored in the
15 state storage means from the supplementary design storage

16 means.

1 73. A receiving apparatus according to Claim 65,
2 wherein the control information received from a
3 transmitting apparatus further includes a supplementary
4 design, and

5 wherein the receiving apparatus further comprises
6 supplementary design recording means for recording a
7 supplementary design included in the separated control
8 information in the supplementary design storage means.

1 74. A receiving apparatus according to Claim 65,
2 wherein the supplementary design storage means includes
3 a plurality of supplementary designs,

4 wherein the receiving apparatus further comprises
5 supplementary design selecting means for selecting one
6 supplementary design from the plurality of supplementary
7 designs stored by the supplementary design storage means, in
8 accordance with a user operation, and

9 wherein the supplementary design reading means reads
10 the selected supplementary design.

1 75. A receiving apparatus according to Claim 65,
2 wherein the identifier allocated to a frame of image
3 data is the same as the identifier allocated to
4 corresponding control information,

5 wherein said control information expresses the

6 identifier allocated to linked image data,

7 wherein said separating means includes:

8 first detecting means for detecting said identifier
9 allocated to said image data;

10 second detecting means for detecting said identifier
11 allocated to said control information; and

12 obtaining means for obtaining said image data and
13 control information if said first and second detecting means
14 have detected said identifiers,

15 and wherein said storage means stores said image data
16 and control information obtained by said obtaining means.

1 76. A receiving apparatus according to Claim 75,

2 wherein image data and control information are
3 transmitted in the image section and vertical blanking
4 interval, respectively, of a television signal as a
5 multiplexed analog broadcast wave,

6 wherein an identifier to be shown as an image is
7 transmitted in a fixed position in non-displayed part of
8 said image section, and

9 wherein said first judging means recognizes an
10 identifier from an image in a fixed position in said non-
11 displayed part.

1 77. A receiving apparatus according to Claim 65,

2 wherein the same identifier is allocated to image data
3 and corresponding control information,

4 wherein said image data and control information are
5 converted into digital data streams to be multiplexed to
6 transmit a multiplexed stream as a multiplexed digital
7 broadcast wave,

8 wherein said digital data streams are allocated first
9 identifying information to identify image data and second
10 identifying information to identify control information,

11 wherein said multiplexed stream comprises said digital
12 data streams and a mapping table showing the correspondence
13 between said first identifying information and image data
14 identifiers and the correspondence between said second
15 identifying information and control information identifiers,
16 said digital data streams and said mapping table being
17 multiplexed,

18 wherein said storage means stores a mapping table
19 separated by said separating means,

20 wherein said control means recognizes an identifier of
21 linked image data indicated by control information, converts
22 said identifier into first identifying information and
23 second identifying information referring to a mapping table,
24 and sets said first identifying information and second
25 identifying information to said separating means,

26 and wherein said separating means includes:

27 first detecting means for detecting said first
28 identifying information from said multiplexed stream;

29 second detecting means for detecting said second
30 identifying information from said multiplexed stream; and

31 obtaining means for obtaining image data and control
32 information indicated by said first and said second
33 identifying information detected by said first and second
34 detecting means.

1 78. A receiving apparatus according to Claim 65,
2 wherein said control information is expressed by at
3 least one combination of a coordinate showing image part in
4 image data corresponding to said control information, and
5 the identifier allocated to linked image data,
6 wherein said operation means receives an operation
7 instruction to designate said image part in image data,
8 and wherein said control means reads the identifier
9 allocated to linked image data corresponding to said
10 designated image region, and sets said identifier to said
11 separating means.

1 79. A receiving apparatus for an interactive communication
2 system using a broadcast wave produced by multiplexing a
3 plurality of frames of image data, control information which
4 includes image link information for each frame of image data
5 showing links with other frames of image data and
6 supplementary design combining information indicating the
7 combining of a supplementary design with said plurality of
8 frames of image data, and audio data corresponding to said
9 plurality of frames of image data, said broadcast wave being
10 repeatedly transmitted, and said supplementary design being

11 combined with an image represented by the image data,
12 wherein the receiving apparatus comprises:
13 separating means for separating a frame of image data
14 and corresponding control information and audio data from
15 said broadcast wave;
16 supplementary design storage means for storing at least
17 one supplementary design;
18 supplementary design reading means for reading a
19 supplementary design from the supplementary design storage
20 means, based on the separated control information;
21 combining means for combining the read supplementary
22 design with the separated image data;
23 storage means for storing said combined image data and
24 separated control information and audio data;
25 reproducing means for reproducing said stored image
26 data and audio data to output an image signal and an audio
27 signal;
28 operation means for receiving an operation instruction
29 to switch image data; and
30 control means for controlling said separating means to
31 separate another frame of image data designated by said
32 control information stored in said storage means according
33 to said operation instruction.

1 80. A receiving apparatus according to Claim 79,
2 wherein the identifier allocated to a frame of image
3 data is the same as the identifier allocated to

4 corresponding control information,
5 wherein said control information expresses the
6 identifier allocated to linked image data,
7 wherein said separating means includes:
8 first detecting means for detecting said identifier
9 allocated to said image data;
10 second detecting means for detecting said identifier
11 allocated to said control information; and
12 obtaining means for obtaining said image data and
13 control information if said first and second detecting means
14 have detected said identifiers,
15 and wherein said storage means stores said image data
16 and control information obtained by said obtaining means.

1 81. A receiving apparatus according to Claim 80,
2 wherein said separating means further includes audio
3 separating means for separating audio data corresponding to
4 said image data, and
5 wherein said storage means stores said audio data
6 separated by said audio separating means.

1 82. A receiving apparatus according to Claim 79,
2 wherein image data and control information are
3 transmitted in the image section and vertical blanking
4 interval, respectively, of a television image signal as a
5 multiplexed analog broadcast wave, while audio data are
6 transmitted as a television audio signal,

7 wherein an identifier to be shown as an image is
8 transmitted in a fixed position in non-displayed part of
9 said image section, and

10 wherein said first detecting means recognizes an
11 identifier from an image in a fixed position of said non-
12 displayed part.

1 83. A receiving apparatus according to Claim 79,

2 wherein the same identifier is allocated to image data
3 and corresponding control information and audio data,

4 wherein said image data, audio data and control
5 information are converted into digital data streams to be
6 multiplexed to transmit a multiplexed stream as a
7 multiplexed digital broadcast wave,

8 wherein said digital data streams are allocated first
9 identifying information to identify image data, second
10 identifying information to identify control information, and
11 third identifying information to identify audio information,

12 wherein said multiplexed stream comprises said digital
13 data streams and a mapping table showing the correspondence
14 between said first identifying information and image data
15 identifiers, the correspondence between said second
16 identifying information and control information identifiers,
17 and the correspondence between said third identifying
18 information and audio information identifiers, said digital
19 data streams and said mapping table being multiplexed,

20 wherein said storage means stores a mapping table

21 separated by said separating means,

22 wherein said control means recognizes an identifier of
23 linked image data indicated by control information, converts
24 said identifier into first identifying information, second
25 identifying information and third identifying information by
26 referring to a mapping table, and sets said first
27 identifying information, second identifying information, and
28 third identifying information in said separating means,

29 and wherein said separating means includes:

30 first detecting means for detecting said first
31 identifying information from said multiplexed stream;

32 second detecting means for detecting said second
33 identifying information from said multiplexed stream; and

34 second detecting means for detecting said second
35 identifying information from said multiplexed stream; and

36 third detecting means for detecting said third
37 identifying information from said multiplexed stream; and

38 obtaining means for obtaining image data, audio data,
39 and control information indicated by said first, second and
40 third identifying information detected by said first,
41 second, and third detecting means.

1 84. A receiving apparatus according to Claim 79,

2 wherein said control information is expressed by at
3 least one combination of a coordinate showing image part in
4 image data corresponding to said control information, and
5 the identifier allocated to linked image data,

6 wherein said operation means receives an operation
7 instruction from a user to designate said image part in
8 image data, and

9 wherein said control means reads the identifier
10 allocated to linked image data corresponding to said
11 designated image region, and sets said identifier to said
12 separating means.

1 85. A receiving method used in a receiving apparatus for an
2 interactive communication system using a broadcast wave
3 produced by multiplexing a plurality of frames of image data
4 and control information including link information showing a
5 link to another of said plurality of frames of image data
6 and supplementary design combining information for each
7 frame of image data indicating a combining of a
8 supplementary design and the image data, the supplementary
9 design being combined with an image represented by the image
10 data,

11 wherein said receiving method comprises:

12 a separating step for separating a frame of image data
13 and corresponding control information from said broadcast
14 wave;

15 a supplementary design reading step for reading a
16 supplementary design stored in a memory;

17 a combining step for combining the read supplementary
18 design and the image data;

19 a storage step for storing said combined image data and

20 said separated control information in a memory;

21 a reproducing step for reproducing said image data
22 stored in the memory to output an image signal;

23 a operation step for receiving a user operation
24 instruction to switch image data;

25 a determining step for determining image data indicated
26 by said control information stored in a memory according to
27 said operation instruction; and

28 a second separating step for separating said determined
29 image data and corresponding control information from said
30 broadcast wave.

1 86. A recording medium for recording a receiving program
2 used in a receiving apparatus for an interactive
3 communication system using a broadcast wave produced by
4 multiplexing a plurality of frames of image data and control
5 information including link information showing a link to
6 another of said plurality of frames of image data and
7 supplementary design combining information for each frame of
8 image data which indicates a combining of a supplementary
9 design with the image data, the supplementary design being
10 combined with an image represented by the image data,

11 wherein the receiving program comprises the steps of:

12 a separating step for separating a frame of image data
13 and corresponding control information from said broadcast
14 wave;

15 a supplementary design reading step for reading a

16 supplementary design stored in a memory;
17 a combining step for combining the read supplementary
18 design and the image data;
19 a storage step for storing said combined image data and
20 said separated control information in a memory;
21 a reproducing step for reproducing said image data
22 stored in the memory to output an image signal;
23 a operation step for receiving a user operation
24 instruction to switch image data;
25 a determining step for determining image data indicated
26 by said control information stored in a memory according to
27 said operation instruction; and
28 a second separating step for separating said determined
29 image data and corresponding control information from said
30 broadcast wave.

1 87. An interactive communication system using a broadcast
2 wave, comprising a transmitting apparatus and a receiving
3 apparatus,
4 said transmitting apparatus comprising:
5 first storage means for storing a plurality of frames
6 of image data;
7 second storage means for storing control information
8 which shows links between said plurality of frames of image
9 data stored in said first storage means, and which indicates
10 a combining of a supplementary design with the image data
11 stored in the first storage means, the supplementary design

12 being stored by a receiving apparatus and being combined
13 with an image represented by the image data; and
14 transmitting means for repeatedly transmitting a
15 predetermined number of frames of image data together with
16 corresponding control information,

17 and said receiving apparatus comprising:

18 separating means for separating a frame of image data
19 and corresponding control information from said broadcast
20 wave;

21 supplementary design storage means for storing at least
22 one supplementary design;

23 supplementary design reading means for reading a
24 supplementary design from the supplementary design storage
25 means, based on the separated control information;

26 combining means for combining the read supplementary
27 design with the separated image data;

28 storage means for storing said combined image data and
29 separated control information;

30 reproducing means for reproducing said stored image
31 data to output an image signal;

32 operation means for receiving an operation instruction
33 from a user to switch image data; and

34 control means for controlling said separating means to
35 separate another frame of image data designated by said
36 control information stored in said storage means according
37 to said operation instruction.

1 88. An interactive communication system according to Claim
2 87, wherein the transmitting means includes:

3 reading means for repeatedly reading said predetermined
4 number of frames of image data together with said
5 corresponding control information from said first and second
6 storage means;

7 multiplexing means for multiplexing image data and
8 control information read by said reading means by
9 transmitting said image data and control information in
10 image sections and vertical blanking intervals,
11 respectively, of a television signal; and

12 output means for outputting the multiplexed television
13 signal as an analog broadcast wave.

1 89. An interactive communication system according to Claim
2 87, wherein said image data and control information stored
3 in said first and second storage means are digitized,

4 and wherein said transmitting means includes:

5 reading means for repeatedly reading said predetermined
6 number of frames of image data together with said
7 corresponding control information from said first and second
8 storage means;

9 multiplexing means for converting image data and
10 control information read by said reading means into digital
11 data streams, and multiplexing said digital data streams to
12 produce a multiplexed stream; and

13 output means for outputting said multiplexed stream as

14 a digital broadcast wave.

1 90. An interactive communication system using a broadcast
2 wave, comprising a transmitting apparatus and a receiving
3 apparatus,

4 wherein said transmitting apparatus comprises:

5 first storage means for storing a plurality of frames
6 of image data with an identifier allocated to each frame of
7 image data;

8 second storage means for storing control information
9 for each frame of image data showing a link to another frame
10 of image data stored in said first image storage means, the
11 same identifier being allocated to corresponding image data
12 and control information, and said control information also
13 indicating a combining of a supplementary design with the
14 image data stored in the first storage means, the
15 supplementary design is being stored by a receiving
16 apparatus and being combined with an image represented by
17 the image data; and

18 transmitting means for repeatedly transmitting a
19 predetermined number of frames of image data together with
20 corresponding control information,

21 and said receiving apparatus comprises:

22 separating means for separating a frame of image data
23 and corresponding control information from said broadcast
24 wave;

25 supplementary design storage means for storing at least

26 one supplementary design;
27 supplementary design reading means for reading a
28 supplementary design from the supplementary design storage
29 means, based on the separated control information;
30 combining means for combining the read supplementary
31 design with the separated image data;
32 storage means for storing said combined image data and
33 separated control information;
34 reproducing means for reproducing said stored image
35 data to output an image signal;
36 operation means for receiving an operation instruction
37 from a user to switch image data; and
38 control means for controlling said separating means to
39 separate another frame of image data designated by said
40 control information stored in said storage means according
41 to said operation instruction.

1 91. An interactive communication system according to Claim
2 90,

3 wherein said control information is represented by said
4 identifiers of linked image data,

5 and wherein said separating means includes:

6 first detecting means for detecting said identifier
7 allocated to said image data;

8 second detecting means for detecting said identifier
9 allocated to said control information; and

10 obtaining means for obtaining said image data and

11 control information if said first and second detecting means
12 have detected said identifiers.

13 92. An interactive communication system using a broadcast
14 wave, comprising a transmitting apparatus and a receiving
15 apparatus,

16 wherein the transmitting apparatus comprises:

17 obtaining means for obtaining pieces of page
18 information representing a page containing characters and
19 images, said page information including link information to
20 show a link to another page, character information, and
21 image information;

22 first producing means for producing one frame of image
23 data containing characters and images in accordance with
24 said character information and image information included in
25 a piece of page information;

26 second producing means for interpreting said link
27 information included in said obtained page information and
28 producing, for each frame of image data, control information
29 including image link information about a link to another
30 frame of image data and supplementary design combining
31 information indicating a combining of a supplementary design
32 with the frame of image data generated by the first
33 producing means, the supplementary design being stored by a
34 receiving apparatus and being combined with an image
35 represented by the image data;

36 first storage means for storing a predetermined number

37 of frames of image data produced by said first producing
38 means;

39 second storage means for storing said control
40 information produced by said second producing means; and
41 transmitting means for repeatedly transmitting said
42 predetermined number of frames of image data together with
43 said control information,

44 and said receiving apparatus comprises:

45 separating means for separating a frame of image data
46 and corresponding control information from said broadcast
47 wave;

48 supplementary design storage means for storing at least
49 one supplementary design;

50 supplementary design reading means for reading a
51 supplementary design from the supplementary design storage
52 means, based on the separated control information;

53 combining means for combining the read supplementary
54 design with the separated image data;

55 storage means for storing said combined image data and
56 separated control information;

57 reproducing means for reproducing said stored image
58 data to output an image signal;

59 operation means for receiving an operation instruction
60 from a user to switch image data; and

61 control means for controlling said separating means to
62 separate another frame of image data designated by said
63 control information stored in said storage means according

~~64~~ to said operation instruction.

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